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Ectoparasites are Major Skin Diseases of Dogs in Gondar, Amhara National Regional State, Ethiopia

[1]Anberbir Tesfaye and [2]Mersha Chanie
[1]Shola Animal Health and Investigation Laboratory, Addis Ababa, Ethiopia
[2] Department of Paraclinical studies, Faculty of Veterinary Medicine, University of Gondar, P.O. Box 196, Gondar, Ethiopia

Abstract: A cross sectional study was conducted from November, 2010 to April, 2011 in the Amhara regional state, Gondar town. The objectives of the study were to determine the prevalence of ectoparasites, determine associated risk factors and identify the most important ectoparasites species of dogs. Skin scrapings for mange mite suspected cases and collection of ectoparasites for lice, fleas and ticks was done using simple random technique. Age, sex, breed and coat color were considered as risk factors. SPSS version 17 (2004) was used for chi- square test and $p<0.05$ was taken as statistically significant. A total of 386 dogs were routinely examined in 21 kebeles. Of these 342 (88.6%) were positive to one or more ectoparasites. *Ctenocephalides felis* was the most prevalent species that account 56.5% (218/386) followed by *Ctenocephalides canis* which was 14.8% (57/386). There was a statistical significant difference ($\chi^2 = 293.6$, $p<0.05$) for coat colors in which the highest prevalence was observed in brown (100%) followed by black colored dogs (93.75%). However, there was no statistical significant difference observed between sex, age and breed ($\chi^2 = 23.3$, 41.5 and 18.56 respectively; $p>0.05$). Ectoparasites were found more prevalent in female dogs (91.8%) than males (87.1%). For age groups of 8-18 months it was 96.6% prevalent and in local breeds it was found 90.3% prevalence. In conclusion, dogs were highly exposed to ectoparasites and hence ectoparasites were serious dermatologic problems in Gondar.

Key words: Dogs, ectoparasite, gondar, prevalence, risk factor

INTRODUCTION

Arthropod ectoparasites constitute a diverse and highly adapted group of animals that inhabit the external body surfaces of vertebrates (Wall and Shearer, 2001). They may live permanently on their host, or they may occupy the host's nest and immediate environment, and visit the body of the host periodically. In either case, there is a close dependency on the host for various life-sustaining resources. The relationship between parasite and host is an ancient one, and the mechanisms by which parasites seek, identify and maintain contact with their host is sophisticated and complex (Gross *et al*., 2005; González *et al*., 2004).

Some species of arthropods play an important role in causing clinical disorders in man and domestic animals, as well as acting as vectors of important diseases such as anaplasmosis, babesiosis, ehrlichiosis and Lyme disease. Among them, fleas have been known to infest man and animals since the paleocenic period. Fleas are moderately specific and the species *Ctenocephalides canis*, *Ctenocephalides felis* (referred to in this paper as *C. canis* and *C. felis*, respectively), *Pulex irritans* and *chidnophaga gallinacea* (from poultry) are usually found in dogs (wall and Shearer, 2001). These parasites are generally associated to dermatitis, affect animals to different degrees according to the nutrition status of the host, its immunological condition and to parasite intensity, and in extreme cases the parasites can lead to death (Urquhart *et al*., 1996; Soulsby, 1982).

Compared to other countries, in Ethiopia there was no study carried out on ectoparasites of dogs if present it is on DVM thesis level, despite the fact that these ectoparasites are also important health hazards to human beings and endemic wild animals near the national parks of Ethiopia. Therefore, the aim of the present investigation was to determine the ectoparasite fauna of domestic dogs according to age, sex, breed and coat color in Gondar town.

MATERIALS AND METHODS

Study area: The study was conducted from October, 2010 to April, 2011 in Gondar town. Gondar town, the capital of North Gondar administrative zone is found in Amhara National Regional State at 727 km northwest of

Corresponding Author: Mersha Chanie, Department of Paraclinical studies, Faculty of Veterinary Medicine, University of Gondar, P.O. Box 196, Gondar, Ethiopia

Table 1: Sex, age and breed of dogs were found brought about the variation in the occurrence of ectoparasites

	Sex*		Age**			Breed***			
Species of ectoparasites	Male	Female	0-8months	8-18months	> 18 months	Exotic	Local	Cross	Total
Ctenocephalides Felis	139	79	81	60	77	0	177	41	218
Ctenocephalides Canis	45	12	34	13	10	0	48	9	57
Boophilus Decoloratus	0	1	1	0	0	0	1	0	1
Pulex Irritans	4	1	3	1	1	0	4	1	5
Xenopsylla Cheopis	9	4	7	2	4	0	11	2	13
Sarcoptes Scabies	1	0	1	0	0	0	0	1	1
Anoplura	0	1	0	0	1	0	1	0	1
Mallophaga	1	0	1	0	0	0	1	0	1
Ceratophyllus Gallinae	1	0	1	0	0	0	1	0	1
Mixed Infestation	30	14	25	9	10	0	36	8	44
Negative	34	10	23	3	18	1	30	13	44
Total	264	122	177	88	121	1	310	75	386

*: For sex the prevalence in male was 87.1% and for female it was 91.8%, the Chi square was 23.3, p-value was 0.1 and degree of freedom (df) 16; **: For age groups the prevalence in 0-8 months it was 87%, in 8-18 months 96.6% and in greater than 18 months 85.1% the Chi square was 41.5, p- value was 0.1 and degree of freedom (df) 32; ***: For breed the prevalence local was 90.3% and in cross breeds it was 82.7%, the Chi square was 18.56, p-value was 0.67 and degree of freedom (df) 32

Addis Ababa, Ethiopia. It is situated at 12.3-13.8ºN latitude, longitude 35.3-35.7ºE and altitude of 2200 meters above sea level. The annual mean minimum and maximum temperature of the area vary between 12.3-17.7 and 22-30ºC, respectively.

Study animals: Dogs of all age groups, sexes and breed in Gondar town were considered as study animals.

Study design: A cross sectional survey was used in order to assess the prevalence of ectoparasites of dogs. The dogs were examined for ectoparasite infestation by a body search, and the whole body was combed with a stainless steel fine-toothed flea comb (Zakson *et al*., 1995). Ticks were manually removed and collected together with any fleas and lice in the comb. These ectoparasites were then stored in 70% ethanol until they were identified. When lesions suspicious of mite infestation (characterized by scaling, scores, dermal encrustations, and hair loss) were observed during the body search, scrapings were taken from the altered part of the skin. Skin scrapings and ear swabs were placed in 10% potassium hydroxide and gently heated to macerate scales, crusts and hair or aural material. Thereafter, the material was centrifuged and the sediment was microscopically examined for mites. Ectoparasites were identified using descriptions and/or keys indicated in Urquhart *et al*. (1996) and Soulsby (1982). The age, sex, breeds and coat color information were recorded in table before it has been entered in to Microsoft excel.

Sampling method and sample size determination: Simple random sampling technique was used and the sample size was determined by the formula given by Thrusfield (2007) by setting 95% confidence interval and 0.05 precision levels. Therefore, taking the expected prevalence of ectoparasites of small animals in Gondar was to be 50%; the sample size was found to be 384.

Data analysis: Data obtained in the study was entered in to Microsoft Excel spread sheet. The frequencies of ectoparasites were compared with variables and expressed in percentage and subjected to chi-square (χ^2) test using SPSS statistical package version 17(2004). For all statistical analysis, a significant level (p-value) of less than 0.05 was considered as statistically significant. The prevalence rate was calculated as the number of positive animal divided by the total number of animal examined.

RESULTS

Laboratory examination: Total prevalence and intensity of external parasite infestation were recorded by body search including whole body comb. Of the total 386 dogs examined, ectoparasites were found on 342 dogs (88.6%). Five species of fleas, namely *Ctenocephalides canis*, *Ctenocephalides felis*, *Pulex irritans*, *Ceratophyllus gallinae and Xenopsylla cheopis*; a species of tick, *Boophilus decoloratus* (both the adults and nymphs); mites, *Sarcoptes scabiei* var. *canis;* two types of lice; Anoplura and Mallophaga were diagnosed.

Ctenocephalides felis was the highest prevalent ectoparasites in all variables followed by *Ctenocephalides canis*. It was also true for mixed infestation that most frequent ectoparasites encountered were *Ctenocephalides felis* and *Ctenocephalides canis*. And the least frequently obtained ectoparasite were mange mite infestation with 1% prevalence.

Dominant ectoparasites of dogs were fleas of different species (Table 1) particularly *Ctenocephalides felis and Ctenocephalides canis*. The number of dogs infested with more than one types of flea was 32(9.36%) and those infested with more than one type of ectoparasites or mixed infestation were 12(3.5%). Out of 342 positives dogs, 339(87.8%), 8(2.34%), 7(2%) and 1(0.3%) were positive to fleas, ticks, louse and mites, respectively. High infestation of ectoparasites was

Table 2: Coat color significantly affects the occurrences of ectoparasites in dogs in Gondar

Coat color	No. of animals examined	No. of positive animals	Prevalence (%)	χ^2	p -value	df
White	164	142	86.6			
Black	80	75	93.75			
Red	64	58	90.6			
Brown	3	3	100			
WhiteWith Red Spots	23	19	82.6	293.6	0.000	112
White With Black Spots	39	35	89.7			
Black With Red Spots	11	9	81.8			
Mixed Colors	2	1	50			
Total	386	342	88.6			

obtained in local breed. The prevalence of ectoparasites was slightly higher in females than males.

No matter how, results showed that an infestation rate varies in different factors especially in breed and sex, there was no statistical significant difference ($p>0.05$) exist between breed, sex and age. Therefore, the prevalence rates in the breeds of dogs were 90.3 and 82.7 for local and cross respectively. The prevalence of ectoparasites of dogs was 87, 96.6 and 85.1% in less than eight months, between eight and eighteen months and above eighteen months of ages respectively; higher prevalence of infestation was obtained in the age group of eight to eighteen months. Generally, from this study we can draw that the presence of variation in breed, sex and age predispose a certain group of dogs from other groups and thus variation in the prevalence of ectoparasites has been recorded.

Physicoclinical examinations: The prevalence of ectoparasites found between coat colors was statistical significant ($p<0.05$). From the Table 2 shown below, the highest prevalence rate were obtained in dogs having brown color followed by black and red coat colors while the lowest prevalence was obtained in dogs having black coat color with white spots.

From the total of 386 dogs examined clinically, 90 (23.31%) have shown clinically manifested gross lesions. Observed clinical signs were alopecia, itching, scratching, crust formation, papules and restlessness. The lesions mostly occur on the dorsal (back) of the animal, erythematous lesions around the base of the tail, the ventral abdomen and the inner part of the thigh. Usually these lesions were seen in areas where the density of hair coat is less or hairless.

DISCUSSION

The present study on ectoparasites of dogs in Gondar town revealed that they are the most important and frequently encountered dermatologic problems. This was evidenced by the outcome of this study which shows us an 88.6% of dogs harboring one or more types of ectoparasites species. However, there was no available data or work done on ectoparasites of dogs and cats as of other domestic animals which are used for meat, milk, skin and hide. Therefore, we believe that this study was the first in its kind carried out in Gondar. So we are obliged to compare and contrast this level of prevalence with evidences from other country surveys.

The total prevalence of this survey (88.6%) is almost similar with the findings of Xhaxhiu *et al*. (2009) in Albania and Torres *et al.* (2009) in Brazil with prevalence of 79 and 70.4%, respectively. These results showed us that ectoparasites are the common and pivotal cause of skin disease in dogs. Higher prevalence rate was recorded in Nigeria (98.5%) by Agbolade *et al.* (2008). And lower prevalence of ectoparasites in dogs was recorded in Turkey (43.75%) by Aldemir (2007), Western Iran (44.3%) by Bahrami and Delpisheh (2010).

In this study five species of fleas (*C. felis*, *C. canis*, *X. cheopis*, *P. irritans* and *C. gallinae*) were identified which makes a total prevalence of 76.16%. This was in agreement with Xhaxhiu *et al*. (2009) report in Albania (75.7%). And higher prevalence rate of fleas in dogs was reported by Bahrami and Delpisheh (2010) in Western Iran (86.8%). *Ctenocephalides felis* was particularly important species which was found in 218 dogs (56.47%) followed by *C. canis* found in 57 dogs (14.76%). This was in agreement with Tavassoli *et al*. (2010) that the cat flea, *Ctenocephalides felis* (67.5%) exhibited the highest prevalence among all flea species found on 756 examined dogs. But it disagrees with the finding of Bahrami and Delpisheh (2010) in which they had investigated *C. canis* in 92.2% and *C. felis* in 7.8% of dogs examined. Klimpel *et al*. (2010) also reported that *Ctenocephalides canis* (39.1%) and *Ctenocephalides felis* (17.4%) in urban stray dogs in Fortaleza (Brazil) were commonest ectoparasites than other species. The concurrent infestation of *Ctenocephalides felis* and *Ctenocephalides canis* was found in 19 dogs which account about 4.92%. Other species of fleas encountered include *Xenopyslla Cheopis*, *Pulex irritans* and *Ceratophyllus gallinae* and the intensity of prevalence were 13(3.36%), 5(1.29%) and 1(0.25%), respectively.

A single species of tick *B. decloratous* was also found on a dog which accounts about 0.25%. This is completely different from Klimpel *et al*. (2010) in Fortaleza (Brazil) which indicated that other species of ticks, *Rhipicephalus sanguineus*, was reported in 100% of the dogs studied. Sarcoptes species was very rare in our

study (0.25%) in contrast to the findings of Jeong-Hyun *et al*. (2008) in Gwang-ju City of the Republic of Korea which was 19.4%.

Lice, mainly the Anoplura and Mallophaga species were identified in the study with the prevalence of 0.51% implying less significant as dermatologic problems of dogs in Gondar town. But we cannot draw any general conclusion that other species of lice are less important in Gondar town to other regions of the country.

Breed, sex, age and coat color have found to affect the prevalence of ectoparasites in dogs. An overall prevalence rate of ectoparasites in breed data showed that local breeds were affected more than cross breed dogs. However, this was not statistically significant level ($p>0.05$). This might be due to treatment of all breeds of dogs in the same environmental and climatic condition. The prevalence of ectoparasites in female dogs and male dogs was found 91.8 and 87%, respectively. Thus, slightly greater susceptibility was observed in female dogs than the male dogs; which it was in agreement with the previous studies by Torres *et al*. (2009) in Brazil and Feather *et al*. (2010). This might be due to the fact that females kept were confined to avoid unwanted breeding and hormonal changes during reproduction period favors re-infestation by fleas but this difference was statistically insignificant ($p>0.05$).

The prevalence of ectoparasites infestation was higher among dogs having age groups of 8-18 months (96.6%) followed by 87 and 85.1% in age below 8 month and above 18 months, respectively. This finding was supported by previous studies conducted in Brazil by *Torres et al*. (2009) that reports the highest prevalence was obtained among dogs less than one year of age. The present study revealed that there was difference among age groups. This difference was statistically insignificant. Color affects the occurrence of ectoparasites in dogs significantly. There was an agreement between the present study and the previous finding performed in Iran by Bahrami and Delpisheh (2010) which stated that dogs with dark or black hair coat had more exposed than those with white or light coat colors. Brown and black coat colored dogs showed highest prevalence; 100 and 93.75%, respectively.

CONCLUSION

While ectoparasites on dogs and cats received significant attention for several reasons in the very recent years, much less is known about the prevalence and associated risk to humans of these ectoparasites in general. Based on a review of the available data on the epidemiology of ectoparasites of dogs and cats in Ethiopia, it was concluded that the dog ectoparsites are the most poorly covered. Documentation of ectoparasitic fauna through survey and inventory is the first step in defining the relationship of endemic parasites and their potential and real impact on domestic animals and humans. The present results, including the implications of transmission of pathogens by ticks and fleas, suggest that further studies should be conducted in Gondar and other parts of the country, especially to estimate the potential risk of relevant arthropod-borne diseases.

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